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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Kazuyoshi Honda

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EXAMINER

WIECZOREK, MICHAEL P

ART UNIT

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/509,463	Applicant(s) HONDA ET AL.	
	Examiner Michael Wieczorek	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 August 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 5 and 7-11 is/are pending in the application.
- 4a) Of the above claim(s) 10 and 11 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 5 and 7-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status of Application

By amendment filed July 16, 2009, claims 5 has been amended and claims 10 and 11 have been withdrawn from consideration as being related to a non-elected invention. Claims 5 and 7 through 11 are currently pending.

Response to Arguments

1. Applicant's arguments, see pages 4-5, filed July 16, 2009, with respect to the rejection(s) of claim(s) 5, 7-9 under 103(a) have been fully considered and are persuasive over the previously presented arguments as none of the references teach or suggested that the electron beam source emits or is capable of emitting an accelerated electron beam. Therefore, the rejection has been withdrawn. However, upon further consideration, the claims are still unobvious over the previously presented prior art in view of additional prior and a new ground(s) of rejection is made in view of this new prior which was necessitated by the amendments to the claims.
2. Furthermore, as to applicant's arguments on page 5, that Higuchi does not teach or suggest that its thermionic beams are provided to collide with a vapor stream of a metallic material, as was discussed in the advisory action dated July 28, 2009, Higuchi clearly teaches this process (Column 3 Lines 37-45, Column 4 Lines 56-68 and Figure 1).

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it

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pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 5, 7-9 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 5 has been amended to disclose that the electron beam source emits an accelerated but there is insufficient evidence within the specification to reasonably convey to one skilled in the art that the electron beam source is limited to one that emits an accelerated electron beam.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

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7. Claims 5, 7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over DeLozanne (U.S. Patent # 5,004,721) in view of Higuchi (U.S. Patent # 5,079,224) and Yanai et al (U.S. Patent # 4,511,594) (Suzuki et al (U.S. Patent # 4,622,919) is cited as evidence regarding electron beam apparatus.)

DeLozanne teaches an apparatus for forming oxide superconductor thin films comprising a vacuum container which comprises a first vacuum chamber 18 and a second vacuum chamber 12 (Column 2 Lines 33-34, Column 3 Lines 46-51 and Figure 1).

The apparatus further comprises a supporting base in the form of substrate 20 and a means for supporting the substrate in the form of substrate mount 21. As is taught by Figure 1 of the reference, both the substrate 20 and substrate mount 21 are inside the vacuum chamber 18, thus the reference teaches a vacuum container or chamber that houses the supporting base (Column 3 Lines 46-51 and Figure 1)

DeLozanne further teaches a resistance heating evaporation source in the form of resistively-heated boat 14b which contains a second thin film material in the form of barium metal and as is taught by Figure 1 of the reference the resistance heating evaporation source 14b is arranged within the vacuum container so as to face the substrate 20, which is the surface to be vapor-deposited (Column 4 Lines 1-3 and Figure 1).

DeLozanne further teaches a electron beam source 14a which is used for the electron beam evaporation of a first thin film material in the form of yttrium metal and as is taught by Figure 1 of the reference the source 14a is arranged in the vacuum container so as to face the substrate 20 (Column 4 Lines 1-3 and Figure 1).

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DeLozanne does not explicitly teach an electron beam source to heat and evaporate the first thin material but this component would be an inherent feature of the taught electron beam source 14a as envisaged by Suzuki et al. Suzuki et al teaches a film forming apparatus comprising a vacuum chamber used to form a film by electron beam evaporation (Abstract and Column 2 Lines 15-18 of Suzuki et al). The electron beam evaporation component of Suzuki et al comprises a evaporator 6 which contains a deposition material A, which is analogous to the first thin film material of DeLozanne and a electron beam source or electron gun 6a which heats and evaporates the deposition material A (Column 3 Lines 1-4 and Figure 1 of Suzuki et al). Thus based on the teachings of Suzuki et al one of ordinary skill in the art would know that the electron beam evaporation source 14a of DeLozanne would inherently comprise an electron beam source to heat and evaporate the material contained in the source 14a.

Though DeLozanne as envisaged by Suzuki et al teaches all the structural components of the disclosed apparatus of claim 5 it does not teach the arrangement of the components where the path along which the electron beam travels intersects with a line segment connecting the resistance heating evaporation source with the surface to be vapor deposited as it travels to the electron evaporation source.

Higuchi teaches an apparatus for forming a superconductive thin film comprising barium yttrium, copper and oxygen (Column 3 Lines 13-18) which is the type of thin film being produced by the apparatus of DeLozanne. The apparatus of Higuchi comprises a resistance heating source containing barium (Column 3 Lines 19-36) which is the same resistance heated material of DeLozanne. Higuchi teaches that the barium metal material is heated and evaporated and the evaporated metal passes through an electron beam where it is ionized (Column 4 Lines

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56-68). Higuchi teaches that by ionizing the metal to be deposited a film is formed with good crystallization and adhesion (Column 1 Lines 30-50).

Thus at the time the present invention was made it would have been obvious to arrange the electron beam source and the resistance heating evaporation source in a manner where the path along which the electron beam travels intersects with a line segment connecting the resistance heating evaporation source with the surface to be vapor deposited as it travels to the electron evaporation source. By arranging the electron beam source of source 14a of DeLozanne as envisaged by Suzuki et al in such a manner such that the electron beam intersects with a line segment connecting the resistance heating evaporation source 14b with substrate 20 the barium evaporated from the source 14b can be ionized by the electron beam and thus produce a thin film which has good crystallization and adhesion as taught by Higuchi. Since it is known in the art that by ionizing barium with an electron beam prior to deposition produces a superior thin film one of ordinary skill in the art would be motivated to ionize the barium and this can be accomplished by using the electron beam source of DeLozanne as envisaged by Suzuki et al.

As for the limitation that the electron beam source and the electron beam evaporation source are arranged so as to be opposed to each other with respect to a straight line connecting the resistance heating evaporation source with the surface to be vapor deposited, the electron beam source and the electron beam evaporation source would have to be opposed to each other with respect to straight line (i.e. on opposite sides of the straight line) since the only way for the resistance heated vapor stream traveling up through this straight line to intersect with the electron beam is for the electron beam source and the electron beam evaporation source to be on opposite or opposing sides of this straight line.

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As for the limitation that the electron beam source is capable of emitting an accelerated electron beam, neither DeLozanne nor Higuchi teach or suggest this limitation.

Yanai teaches an apparatus for depositing a metal or alloy film on a substrate using an electron beam gun in a vacuum chamber (Abstract and Figures 1 and 2). The electron gun or electron beam source used by the apparatus of Yanai is a self-accelerating or Pierce type electron gun, which emits an accelerated electron beam, and Yanai teaches that the advantage of this type of electron gun is that it is capable of vaporizing large quantities of film material (Column 2 Lines 3-9). Furthermore, Yanai teaches that the types of materials vaporized by the electron gun include those comprising copper and yttrium (Column 2 Lines 10-18), which are the two materials be vaporized by the electron beam sources of DeLozanne (Column 4 Lines 1-8 of DeLozanne).

At the time the present invention was made it would have been obvious to one having ordinary skill in the art to have an electron beam source capable of emitting an accelerated electron beam. Yanai teaches a known electron beam source in the art in the form of a self-accelerating electron gun, which emits an accelerated electron beam, and which is capable of vaporizing copper and yttrium comprising metals and alloys, thus one of ordinary skill in the art would have a reasonable expectation of success in substituting the electron beam source of DeLozanne with the electron gun of Yanai.

As for claim 7, DeLozanne teaches that the apparatus comprises a glass nozzle 28 which sprays a reactive gas in the form of oxygen onto the substrate 20 (Column 3 Lines 56-63 and Figure 1) thus DeLozanne teaches that the nozzle 28 introduces a reactive gas in a portion on the surface to be vapor-deposited in which the thin film is to be formed.

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As for claim 9, the specification of the present case defines “substantially on the same plane” when the electron beam can pass through the vapor stream of the second thin film material that is emanating from the resistance heating source (Page 5 Lines 10-15 of the specification of the present case). As was discussed in the claim 5 rejection, based on the teachings of DeLozanne as envisage by Suzuki et al in view of Higuchi the electron beam source and the resistance heating source are arranged so that the electron beam emanated from the electron beam source intersects a line segment connecting the resistance heating source with the surface to be vapor deposited thereby allowing the electron beam to pass through the vapor stream of the second thin film material thus ionizing it. For this reason it can be considered that the electron beam evaporation source, the electron beam source and the resistance heating evaporation source of the apparatus taught by DeLozanne as envisage by Suzuki et al in view of Higuchi are substantially on the same plane. Thus claim 9 is rejected.

8. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over DeLozanne in view of Higuchi and Yanai as applied to claim 5 above, and further in view of Suzuki et al.

The teachings of DeLozanne, Higuchi and Yanai as they apply to claim 5 have been discussed previously but neither of the references teaches that the apparatus comprises a bias device for applying a bias voltage to the surface to be vapor-deposited.

The apparatus of Suzuki et al comprising a bias device in the form of a bias voltage source 14 which is connected to, thus supplying bias voltage, a surface to be vapor deposited in the form of substrate T. Suzuki et al teaches that the bias voltage source 14 is present to accelerate the ionized vapor toward the substrate T for deposition. In other words the bias

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voltage supplied to substrate T attracts the ionized vapor to the surface of substrate T. (Column 4 Lines 9-16, Figure 2)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the present invention was made to add the bias device of Suzuki et al to the apparatus of DeLozanne in view of Higuchi and Yanai so that a bias voltage could be supplied to the deposition surface thus causing more attraction between the surface to be vapor deposited and the ionized thin film vapor materials.

Conclusion

Claims 5, 7 through 9 have been rejected. Claims 10 and 11 have been withdrawn from consideration as being a non-elected invention. No claims were allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Wieczorek whose telephone number is (571)270-5341. The examiner can normally be reached on Monday through Friday; 7:30 AM to 5:00 PM (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on (571)272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Michael Wieczorek/
Examiner, Art Unit 1792

/Michael Cleveland/
Supervisory Patent Examiner, Art Unit 1792